Ten Challenges in Advancing Machine Learning Technologies toward 6G

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Abstract

As the 5G standard is being completed, academia and industry have begun to consider a more developed cellular communication technique, 6G, which is expected to achieve high data rates up to 1 Tb/s and broad frequency bands of 100 GHz to 3 THz. Besides the significant upgrade of the key communication metrics, Artificial Intelligence (AI) has been envisioned by many researchers as the most important feature of 6G, since the state-of-the-art machine learning technique has been adopted as the top solution in many extremely complex scenarios. Network intelligentization will be the new trend to address the challenges of exponentially increasing number of connected heterogeneous devices. However, compared with the application of machine learning in other fields, such as computer games, current research on intelligent networking still has a long way to go to realize the automatically-configured cellular communication systems. Various problems in terms of communication system, machine learning architectures, and computation efficiency should be addressed for the full use of this technique in 6G. In this paper, we analyze machine learning techniques and introduce 10 most critical challenges in advancing the intelligent 6G system.